Polarized Neutron Reflectometry (PNR)
Frequently Asked Questions

What can PNR tell me about my samples?

PNR can be used to measure magnetic and chemical depth profiles. If you're dealing with magnetic films, and you have questions about anything "interfacial" or "depth-dependent", PNR may very well be useful. Additionally, PNR can provide information about *in-plane* correlations, making it useful for studies of pattered magnetic structures.

How big of a sample do I need for PNR of magnetic films?

As a rule, larger surface area is better (more reflected signal). For low temperature measurements, 2 x 2 cm surface area is ideal, as that's approximately the maximum area that our displex refrigerator can accommodate.

What about film thickness?

About 15-5000 Å per layer.

How "magnetic" do my samples need to be for PNR to be sensitive to the magnetic depth profile?

PNR is sensitive to the magnetization. We have successfully depth profiled films with net magnetizations as small as ~10 emu/cc. Strictly speaking though, the detectable magnetization is dependent on many things, such as the thickness, contrast, and roughness of the layers, and the surface area of the sample.

What sort of sample environments can be supported for PNR on the NG-1 Reflectometer?

Lots. We have displex closed-cycle refrigerators, cryostats, and furnaces that provide a temperature range of 50 mK to 675 K, an electromagnet that can apply up to 0.7 T, and a laser-illumination setup.

Who do I contact with other questions?

Feel free to shoot us an email: Brian Kirby (brian.kirby@nist.gov), Julie Borchers (julie.borchers@nist.gov), or Shannon Watson (shannon.watson@nist.gov) .